## ART. IV.—On a Patent Ear-trumpet and Stethoscope, invented by DAVID WILKINSON, Esq.

[Read by Mr. C. Wilkinson, 8th October, 1866.]

Mr. President and Gentlemen,—I have much pleasure in laying before you a new ear-trumpet and stethoscope, or rather I should say, some improvements on the ordinary instruments of this kind, invented by my father, Mr. David Wilkinson. He communicated his ideas to this society some three years ago, but as there were no instruments accompanying his communication it does not seem to have been considered. Lately some of these instruments have been made and partially tested.

In order, therefore, to make known that which may prove beneficial to many members of the community at large, whose welfare it is the chief object and desire of the Royal Society to promote, I could not do so in a more satisfactory manner than by submitting the following brief description to your consideration. That the present construction of instruments for conveying sound to the ear is but imperfectly adapted to the purpose, is evinced by the very partial relief they afford to those whose great affliction necessitates the use of them.

I will here premise that it is not my intention to enter into the acoustic principles on which depend the proper construction of ear-trumpets; nor to describe the anatomy of the ear; for it would be extreme presumption for one like myself, I must confess, so little acquainted with these scientific subjects, to attempt to do so before the professional members and others whom I have now the privilege of addressing. I will, however, allude to a few of the more simple points connected with these subjects, to which it will be necessary for me to refer in describing these instruments. Our perception of sound ordinarily results from the pulses or vibrations in the air conveyed by the various processes of the ear to the auditory nerves, whence the impressions produced are communicated to the brain where their effects are realized.

The principal parts of the ear are the outer-ear, the drum of the ear, and the sensorium, or inner-ear. The outer-ear seems formed as it were like an ear-trumpet, to catch the vibrations in the air and conduct them to a tube, through which they pass into the head. In a short distance this tube has its passage stopped by a thin membrane—the drum of the ear—stretched tightly across it. Behind this lies a cavity, the "barrel of the ear" or tympanum, through which runs a chain of four small bones connecting the drum of the ear with the sensorium. These bones are supposed to continue the vibration produced upon the drum by the vibratory action of the air, towards the sensorium, whence the brain receives its impressions.

Thus, from the disorder of any one of these organs, we may readily conceive how various may be the causes from which deafness may arise. If the inner ear or sensorium remains perfect, the loss of hearing produced by the destruction of the drum, or the derangement of any of the other parts of the ear, can be in many cases remedied by the use of instruments which will convey a greater degree of sound than that which the ear alone receives.

On the other hand, I have been given to understand that, if deafness arises from the disorder of the sensorium, no introduction of increase of sound will assist the hearing; for according as the auditory nerve is capable of receiving the vibrations imparted to it, in the same measure will be its power of communicating to the brain the impressions those vibrations produce. It would therefore appear evident that the advantage deaf persons will derive from the use of ear-trumpets will depend in a great measure, if not entirely, on the nature of their deafness.

There are two kinds of ear-trumpets commonly used; one consisting of a long indiarubber tube fitted with an earpiece at one end, and at the other a bell-shaped piece into which it is necessary to speak when addressing the deaf This, therefore, cannot be made use of on all occaperson. sions; the mode of using it also renders it very inconvenient. The other trumpet is simply a small funnel-shaped instrument, curved at the narrower end, which is inserted in the ear. The only apparent object of this instrument is to reflect that amount of sound received at the large end to the smaller, where it is collected as it were into one point, and in this condensed state is rendered more audible than could have been effected by the ear alone. It is to an improvement on this latter trumpet that I would now direct your attention. It consists simply of two tubes; one inside, the other but only connected at the smaller end. The object of this double arrangement is to prevent the hand or any other

soft substance from touching the inner metallic tube, otherwise its vibratory action would in a measure be checked. For instance, if you strike a glass tumbler or a bell, the ringing sound almost immediately ceases on bringing the hand in contact with the vibrating body. The construction of this trumpet, however, allows the vibrations produced upon the inner tube by the pulses of the air to pass freely Thus you will observe that in addition to the into the ear. vibrations reflected into the ear through the medium of the air, we have those produced and transmitted by the sonorous inner metallic tube, and the sound is thereby strengthened. Sound is conducted by some sonorous metals about ten times quicker than through the air; but as the conducting power of the latter is at the rate of about eleven hundred (1,100)feet in a second, the difference in an instrument of this size would be imperceptible. It may not be necessary for the outer tube to be constructed of metal, probably any material strong enough to keep the remainder of the tubes apart, when joined at the smaller end, would be suitable.

I believe this ear-trumpet will not assist all cases of deafness; for, as I have previously remarked, how variable may be the nature of deafness; so I have no doubt the adaptation of this or any other ear-trumpet will vary accordingly.

In two cases of deafness this was tried without the persons deriving any greater benefit from it than from those ordinarily in use. On the other hand, others have tried it and assured me of its efficiency, of which I have had satisfactory evidence in the increased facility with which I could converse with them when using it.

The stethoscope, though differently constructed, is on the same principle as the ear-trumpet. By its means the peculiar sounds emitted by the vibratory action of certain parts of the body are readily conducted to the ear. The sound transmitted is also strengthened by resonance, which the tube, passing up the centre of the stethoscope, produces. In this tube is introduced a metallic wire connected only at both ends of the instrument; it is tightly drawn, and by its tension is rendered extremely sensitive to the slightest vibration. The sound received at the one end is immediately communicated to the wire, by which it is more rapidly conveyed to the ear than by the wood or the air in the tube, with this addition, the sound is greatly increased. Wood is an excellent conductor of sound; the difference, therefore, in the conducting power of these media must be

less perceptible than in the ear-trumpet just described, if indeed in this latter it is even possible to perceive any difference.

One of the first medical men in this city has tried this stethoscope, and remarked the great increase of sound it conveyed; he also considered it would be most valuable for those members of the medical profession whose hearing was rather defective in detecting stethoscopic sounds.

I have not had any experience in stethoscopy, so must therefore submit this instrument to medical men to judge of its efficiency.

## ART. V.—Notes on Australian Coleoptera. By Count F. De Castelnau.

(Read by Dr. Mueller, 12th November, 1866.)

## No. 1. Cicindelidæ.

One of the most remarkable facts connected with the distribution of animals in Australia, is certainly the absence of the *cicindelidæ* in all the southern part of that Continent; that family of insects being otherwise spread over all the regions of the globe capable of bearing animal life. This fact is just as interesting as is the absence of ophidian reptiles in New Zealand and New Caledonia.

Little, or nearly nothing, is yet known of the entomological fauna of the northern and north western territories; but the eastern coast, which has been studied with some care, presents a certain number of *cicindelidæ*, among which we find with surprise the *Megacephala*, a form believed till lately to be peculiar to the warmest parts of Africa, which bare, we must remember, a considerable resemblance with the central regions of Australia, to which it is confined on this continent.

An allied genus, *Tetracha*, had also been long ago signalised by Hope from specimens brought from Port Essington. Since then other species have been found by Messrs. Masters and Thouzet, at Port Denison and Rockhampton, and also by Mr. Waterhouse, in the central parts of Australia, during his expedition across the continent, under Mr. Stuart.

*Distipsidera* is common in most parts of Queensland, the species being very nearly allied to those which inhabit in great numbers New Caledonia and the neighbouring islands.

30